ET-70 January 1936

United States Department of Agriculture
Bureau of Entomology and Plant Quarantine

A MOBILE POWER SOIL SIFTER

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A mechanical soil sifter, to reduce labor and to increase the number of samples possible to be taken in a given time, was developed very early in the Pacific Northwest. The first machine 1/ devised was a hand machine. A more mobile power soil sifter has finally been developed, with an approximate sifting capacity of 5 square-foot samples or 20 quarter-square-foot samples per hour. The number of samples sifted per hour will vary with such soil factors as moisture, texture, and compactness.

The soil sifter in its final development is pictured in figures 1 and 2. An old second-hand automobile frame was cut down, shaped, and bolted to the front axle assembly of the same automobile to provide the bed for the sifter. On this bed was bolted securely the angle-iron frame from which the moving parts are suspended. This angle-iron frame is rigidly braced and all corners and joints are brazed. The reinforced oak sifter frame is suspended from 4 steel rocker arms, the ends of which are set in babbitted bearing boxes equipped with grease cups. The main shaft on the front of the angle-iron frame is equipped with 4 babbitted bearings and grease cups. An eccentric on the center of the main shaft is connected with the sifter frame by a short oak connecting rod to furnish a 3½-inch throw, back and forth, to the sifter frame. The speed ratio of the back-and-forth movements of the sifter frame depends of course upon the number of revolutions per minute of the eccentric. A rate of 180 r. p. m. has been found to give the best results. Power is transmitted from the fly wheel to the eccentric through two sprockets equipped with bicycle chain. The fly wheel and sprockets turn freely on shafts. The main shaft is connected with the upper sprocket by means of a simple jaw clutch (keyed to the shaft) which slides into jaws of the sprocket. The lower sprocket is attached to the fly wheel. Power is furnished to the fly wheel by means of a flat belt from a pulley on the engine. The engine used was a 1-horsepower, air-cooled, 4-cycle gasoline motor, equipped with a hand-lever starter, muffler, and carburetor air cleaner. A third leg with a broad base was hinged in front to keep the machine in a level position when in use or at rest. This leg is held rigidly in a metal slot by a pin, but can be turned out of the way when the outfit is to be attached to an automobile as a trailer. A suitable trailer hitch is provided.

1/ Lane, M. C., and Shirck, F. H. A Soil Sifter for Subterranean Insect Investigations. Jour. Econ. Ent. 934-936, illus. 1928.

The screens are made to nest one above the other inside the oak sifter frame and are held by a narrow metal flange on the bottom edge of the sifter frame. Screen frames are reinforced by metal corners inside and made 1½ inches deep to prevent loss of soil over the edges. A small metal flange is provided on one end inside for a finger hold in removing the screens from the frame. The screens can be removed from the sifter while in motion for dumping or picking off the insects. Any combination of different mesh sizes of screen can be provided, according to soil conditions or type of insects to be collected. Incidentally, the smaller the diameter of the screen wire the faster and better it will sift damp or wet soil. For the best results in sifting for wireworms, a screen of 4 meshes to the inch should be used on top for breaking up lumps and removing trash. Under that, a 10 or 12 mesh screen can be used to catch adults and large wireworms. The mesh of the bottom screen should be small enough to catch the smaller wireworms, yet large enough to allow the greater part of the soil to pass through. The usual size is 16-mesh, but when soil is fairly dry an 18-mesh screen is used. Ordinary wire cloth screen, such as is commonly used to exclude insects, has been found to be the most efficient and economical type of screen to use. Hardware-grade screen can be used in the 4- and 10-mesh sizes.

The cost of the complete sifter should approximate $100, and the engine will cost an additional $50. The important specifications for the principal parts of the soil sifter are as follows:

Specifications of Principal Parts of Soil Sifter

Trailer frame bed	3 ft. × 7 ft. over all
Angle iron frame	31 in. wide, 60 in. long, 18 in. high
Size of angle iron	1¾ in. × 3/16 in.
Size of oak sifter frame	Outside: 24 in. × 34 in. × 6 in. Inside: 21½ in. × 31¾ in. × 6 in.
Size of pine screen frames	Outside: 21⅜ in. × 31⅝ in. × 1½ in.
Rocker arms	¾ in. steel, 8 in. center to center of arms
Length of bend, rocker arms	3½ in.
Main shaft	⅞ in. × 32 in., chromium steel
Connecting rod of oak	1½ in. stock, 20½ in. long
Fly wheel	2 in. × 11½ in. outside diameter
Size of engine pulley	2⅞ in. diameter
Chain	⅜ in. roller
Sprockets	Upper, 39 teeth; lower, 17 teeth
Eccentric	6 in. diameter inside band over all 7 in. diameter outside band over all
Belt	2 in. × 5½ ft. approx.

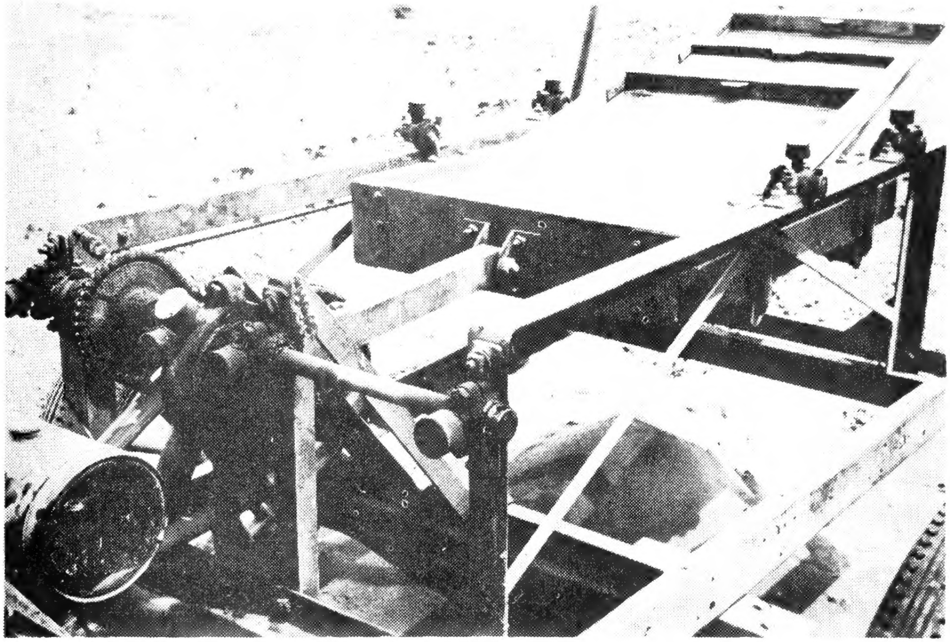

Figure 1.--Side view of mechanical soil sifter, showing general construction.

Figure 2.--Close-up view of mechanical soil sifter, with screens partly removed and showing main shaft and eccentric.